IFC-National Bank of Belgium Workshop on "*Data needs and Statistics compilation for macroprudential analysis*"

Brussels, Belgium, 18-19 May 2017

Household finance in Europe[1]

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[1] This presentation was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

Household Finance in Europe

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Motivation

- Understanding how households respond to changes in income and wealth is crucial for evaluating the macroeconomic impact of policies.
- Recent research suggests that heterogeneous responses matter for aggregate consumption.
- Heterogeneity of households in several layers:
  - demographic characteristics (micro data),
  - institutional setup (within and across countries),
  - deep (preference) parameters (unobservable).
- Relatively little research for Europe that combines micro data and computational techniques to characterize preferences and marginal propensities to consume out of income.

Overview

- **Paper**
  - Life-cycle model with portfolio choice, credit constraints, bequest motive and precautionary savings.
  - Careful calibration to country-specific income and return processes.
  - Estimate the model using data from the HFCS for France, Germany, Italy and Spain.
  - Use model to simulate policies (using the distribution of MPCs).
- **Contribution**
  - Interpret quantitatively role of key factors for wealth accumulation across countries.
  - Combine micro data and model for policy evaluation.
  - Identify vulnerabilities of households in several dimensions.

Literature – Portfolio choice/heterogeneity in MPCs/country differences

- **Life-cycle models with portfolio choice:** Cooper and Zhu (2015), Cocco et al. (2005), Epstein and Zin (1989) and Weil (1990)...
- **Heterogeneity:** Kaplan et al. (2016), Carroll et al. (2015), Jappelli and Pistaferri (2014)
- **Wealth effects on consumption:** Mian et al. (2013), Carroll et al. (2014), Dynan (2012), Dynan et al. (2004)

Some data facts – Moment Conditions

- Education is a key determinant for household behavior.
- Between and within country heterogeneity.

Table: Moment Conditions

	France		Germany		Italy		Spain	
	Low	High	Low	High	Low	High	Low	High
part. rate	0.454	0.667	0.392	0.560	0.232	0.470	0.195	0.360
stock share	0.500	0.447	0.500	0.445	0.508	0.451	0.473	0.376
WI	0.350	0.749	0.303	0.552	0.180	0.399	0.287	0.519
WI(h)	1.038	3.133	4.113	4.794	8.039	7.650	5.563	6.064
average age	52.5	53.0	54.8	43.7	54.4	47.0	56.7	51.0
sample size	2085	1480	10833	4173	3988	2209	7013	938

This table displays the participation rate (direct and indirect stock holdings), the share of stocks (for participants), the median wealth income ratio, with and without housing (h) for households in each country by education attainment. The moments come from the HFCS Euro Area Survey.

The model – Main features

- **Households maximize expected lifetime utility**
  - Households choose: consumption (C), bond holdings (B) and stock holdings (S).
- **Idiosyncratic shocks to income and risky financial assets**
  - Exogenous income process: deterministic and stochastic components.
  - Risky asset return stochastic (R^s), bond return fixed (R^b).
- **Liquidity constraints, financial frictions, bequest motive**
  - Participation and re-balancing costs.
  - Bequest motive.
- **Consumption floor** ($\underline{c}$) coming from government transfer.
- Ingredients produce **precautionary savings** and a distribution of MPCs.

The model – Income processes

- Deterministic income profile plus a stochastic shock.
- Estimated from ECHP data.

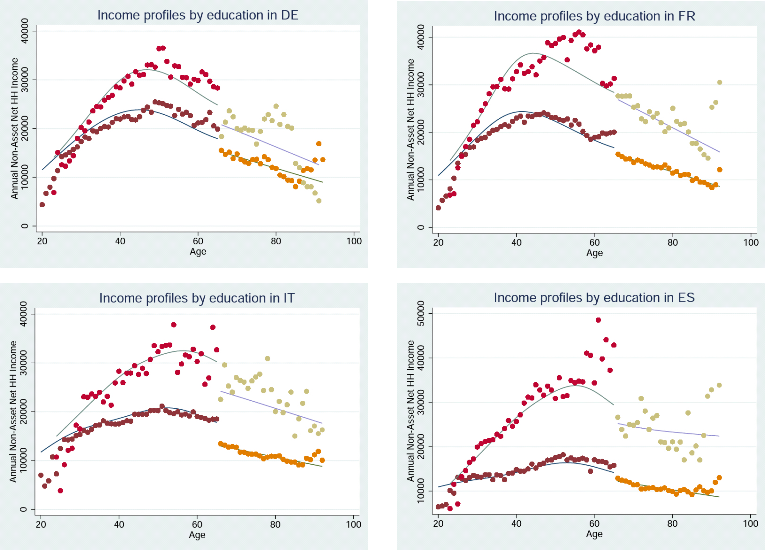
  - Income profile

$$log(Y_{i,t}) = const. + polynomial(age) + HHComp + TimeEff.$$

  - Income shocks

$$\begin{aligned} \tilde{y}_{i,t} &= z_{i,t} + \epsilon_{i,t} \\ z_{i,t} &= \rho z_{i,t-1} + \eta_{i,t} \end{aligned}$$

The model – Income profiles



The model – Asset returns

- Real return on bonds is set at 2% for all countries
- Mean and standard deviations for real stock returns taken from historical data

Table: Return Processes by country

	Germany	**France**	**Italy**	**Spain**
mean	1.085	1.092	1.046	1.077
std	0.310	0.291	0.290	0.245

The model – Solution and estimation

- **Finite dynamic optimization problem solved by backward recursion**
  - Discretized shocks, initial distribution of assets...
  - Value function iteration
- **Simulated method of moments estimation**
  - Participation rate, stock share, (liquid) wealth-to-income ratio are moments to be matched
  - Explain moments by age and education (plus home equity controls)
- **Estimate MPC**
  - For each single household
  - Matching the liquid wealth distribution

Results – Homogeneous parameters

Table: Parameter estimates by country

	β	γ	F	Γ	L	ϕ	$\underline{c}$	θ	Fit
Germany	0.841	6.003	0.02	0.028	0.088	1.952	0.251	0.626	12.047
Spain	0.836	7.733	0.013	0.018	0.053	2.821	0.206	0.636	37.992
France	0.872	6.624	0.012	0.028	0.09	2.569	0.157	0.511	66.985
Italy	0.861	5.381	0.02	0.023	0.073	2.346	0.29	0.555	1.806

- Discount factors lower than conventional value (0.95)
- High risk aversion coefficients (US around 4)
- High stock participation costs and risk aversion
- Importance of bequests stronger in some countries

Results– Heterogeneous parameters

Table: Heterogeneous parameter estimates by country and education

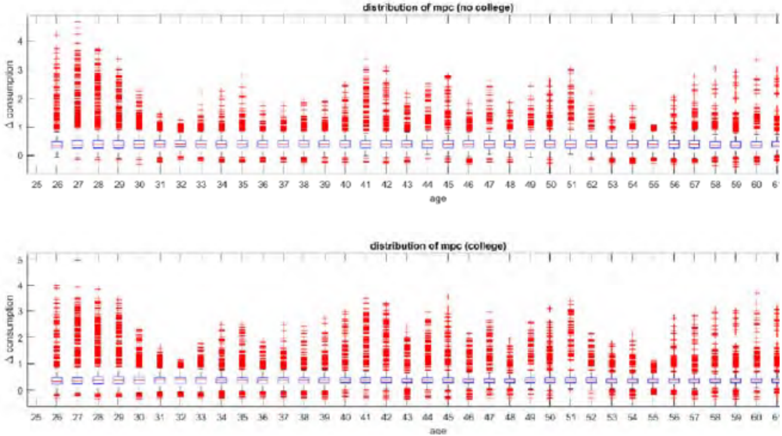
	β_0	β_1	γ	F_0	F_1	Γ	L	ϕ	$\underline{c}$	θ	Fit
						Heterogeneous β					
Germany	0.862	0.901	9.990	0.010		0.033	0.084	2.434	0.300	0.662	15.363
Spain	0.845	0.905	9.689	0.016		0.032	0.091	1.942	0.308	0.677	35.715
France	0.866	0.895	9.974	0.013		0.031	0.077	2.696	0.282	0.694	59.269
Italy	0.871	0.880	6.924	0.023		0.027	0.075	2.455	0.239	0.653	1.261
						Heterogeneous F					
Germany	0.817		6.5733	0.0191	0.0163	0.0292	0.0809	2.2569	0.3481	0.6123	9.6950
Spain	0.8623		9.5633	0.0190	0.0223	0.0305	0.0701	2.9954	0.2721	0.7329	40.7167
France	0.8655		9.9800	0.0115	0.0209	0.0329	0.0808	2.8703	0.2951	0.6811	42.7357
Italy	0.8587		5.7937	0.0292	0.0197	0.0286	0.0617	2.9979	0.2405	0.4970	0.9441

This table reports parameter estimates. For the heterogeneous β (F) case, the subscript 0 is for the low education group and the subscript 1 is for the high education group. The pooled groups are reported under the subscript 0 case.

- Lower educated households are less patient than college grads.
- Participation cost heterogeneity differs across countries.

Distribution of MPCs across the Life Cycle

- MPCs significantly different from zero across the life cycle with a median $\approx$ 0.2–0.6, wide heterogeneity
- Life cycle pattern, heterogeneity across education



Distribution of MPCs across Countries

- **Depending on wealth distribution**
  - MPC are higher in countries in which HH hold less liquid wealth or where wealth inequality is higher.
  - Results in line with Carroll et al. (2014) who find aggregate MPC between 0.2 and 0.4.
- **Depending on demographics**
  - Low wealth (and income) households are more sensitive to shocks.
  - MPCs are highest for the young, stable through middle age and increase in older age.
- **Policy evaluation**
  - Same policy (e.g. change in rates) has different effects that can be related to different household characteristics.
  - Helpful in understanding the transmission mechanism of monetary policy.

Conclusion

- **A state-of the art model** with portfolio choice implies significant differences in estimates within and across countries
  - Differences by education, countries.
  - Underlines the importance of cross-country household data sets for model-based research.
- **Same policies have different effects in different countries**
  - Cross-country heterogeneity in MPCs.
  - Distribution of MPCs driven by wealth distribution and household preferences.
- **Further applications extend to household stress testing, monetary and fiscal policy evaluation**

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Backup Slides

The model – Income proesses

Table: Stochastic Processes by education and country

	Germany			France		
	ρ	σ^2_η	σ^2_ϵ	ρ	σ^2_η	σ^2_ϵ
No college	0.895***	0.022***	0.016***	0.971***	0.031***	0.006*
	(0.005)	(0.001)	(0.001)	(0.014)	(0.006)	(0.003)
College	0.937***	0.020***	0.011***	0.941***	0.023***	0.018***
	(0.008)	(0.001)	(0.001)	(0.007)	(0.003)	(0.002)
	Italy			**Spain**		
	ρ	σ^2_η	σ^2_ϵ	ρ	σ^2_η	σ^2_ϵ
No college	0.944***	0.072***	0.020***	0.951***	0.092***	0.016***
	(0.005)	(0.003)	(0.002)	(0.007)	(0.004)	(0.002)
College	0.921***	0.029***	0.022***	0.986***	0.058***	0.004**
	(0.016)	(0.01)	(0.006)	(0.007)	(0.004)	(0.002)

Robust standard errors in parentheses. $***p < 0.01, **p < 0.05, *p < 0.1$

Model—Preferences

- Value Function expressed as *recursive utility*, following Epstein-Zin-Weil

$$V_t = \left\{ (1-\beta) c_t^{1-1/\theta} + \beta \left[(1-\nu_{t+1}) \left(E_t V_{t+1}^{1-\gamma} \right)^{\frac{1}{1-\gamma}} + \nu_{t+1} \left(E_t B_{t+1}^{1-\gamma} \right)^{\frac{1}{1-\gamma}} \right]^{1-1/\theta} \right\}^{\frac{1}{1-1/\theta}}$$

ν_{t+1} conditional prob to die; γ risk preference; θ substitution effect

- Bequest function:

$$B(Z) = L(\phi + Z)$$

L bequest intensity; ϕ degree of luxuriousness

Optimization Problem

- Maximize

$$v_t(\Omega) = \max\{v_t^a(\Omega), v_t^n(\Omega), v_t^x(\Omega)\}$$

- where $\Omega = (y, A)$ is the current household state

- Household chooses to adjust

$$v_t^a(\Omega) = \max_{A^{b'} \geq \underline{A}^b, A^{s'} \geq 0} u(c) + \beta E_{y'|y} \left\{(1 - \nu_{t+1}) v_{t+1}(\Omega') + \nu_{t+1} B(R^b A^{b'} + R^{s'} A^{s'})\right\}$$

- s.t. budget constraints and transfer income

$$c = y + TR + \sum_{i=b,s} R^i A^i - \sum_{i=b,s} A^{i'} - F$$

$$TR = \max\{0, \underline{c} - (y + \sum_{i=b,s} R^i A^i)\}$$

Structural Estimation

- Simulate model using the calibrated values.
- Use moments from the cross-sectional data (participation rate, stock share, wealth-to-income ratio).
- Estimate $\alpha \equiv \{\beta, \gamma, \theta L, \phi, F, \Gamma, \underline{c}\}$ by SMM, minimizing distance of model from data:

$$\big(G_Q - G_{\hat{Q}}(\theta)\big)' D \big(G_Q - G_{\hat{Q}}(\theta)\big)$$

- Need to recompute model for each estimation and simulation loop.